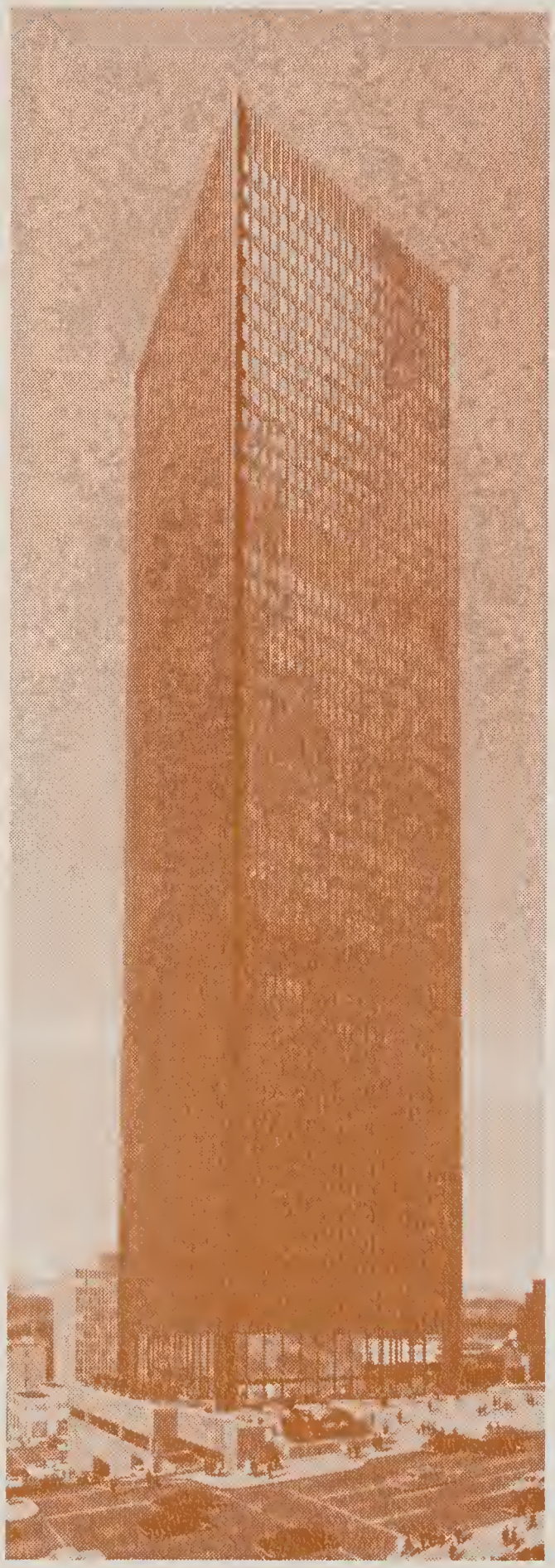
THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

FALL 1967



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THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

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COVER PHOTO:

Actinidia chinensis in early fruiting stage

PHOTO BY: WILLIAM ENG

ARBORETUM FOUNDATION

Financial Statement

May 1, 1966 - April 30, 1967

FUNDS ON HAND May 1, 1966		$162,137.80
Receipts (operative): 5/1/66 - 4/30/67		
Dues from members		20,615.00
Unit Council operations		12,404.77
Donations (generally)		3,571.23
Floral Hall Donations		3,687.00
Bulletin		1,270.89
Education Program		1,461.07
Japanese Garden		740.00
Memorials		812.15
Office Miscellaneous		498.95
Membership (Adjusted Postage)		1.50
		$ 45,062.56
Capital Income:		
Interest on Savings		$ 6,129.70
Interest on Endowment Trust Principal		671.15
		$ 6,800.85
Disbursements (operative):		
Salaries		$ 11,600.00
Telephone		297.63
Office Miscellaneous		597.99
Bulletin		5,217.37
Education Program		3,258.00
Unit Council operation:		
Cost of material for plant sale	$ 4,126.65	
Maintenance of Clubhouse and Greenhouse	993.89	
Publication of Cutting Books	813.23	
Patricia Calvert Greenhouse Supplies	150.40	
Office Equipment	138.06	
Clubhouse Insurance	62.00	
Miscellaneous	461.52	
		6,745.75
Publicity		660.00
Special Fee - Entertainment		117.50
Membership		1,546.14
F. I. C. A.		465.90
Annual Audit		100.00
University of Washington (Travel)		300.00
Donations		25.00
Office Equipment		138.07
Christmas gifts		225.00
		$ 31,294.35
Disbursements (capital):		
To University of Washington (Department of Forestry):		
Contributions out of General Fund for benefit of Arboretum		17,151.43
Transfer of Memorials for Arboretum		3,819.20
Unit Council Funds contributed		5,506.93
Transfer of Japanese Garden contribution		500.00
		$ 26,977.56

SUMMARY

FUNDS ON HAND May 1, 1966		$162,137.80
TOTAL RECEIPTS (all sources):		
Operative	$ 45,062.56	
Capital	6,800.85	
		51,863.41
		$214,001.21
TOTAL DISBURSEMENTS (from all funds):		
Operative	$ 31,294.35	
Capital	26,977.56	
		58,271.91
FUNDS ON HAND April 30, 1967		$155,729.30

FISCAL YEAR SUMMATION 1966 -1967	PETTY CASH	CHECKING ACCOUNT	SAVINGS ACCOUNT	TOTAL
Unrestricted General Funds	25.00	8,136.36	22,065.61	30,226.97
Restricted Funds:				
Japanese Garden		58.00	175.81	233.81
Lilac Fund		473.97		473.97
Memorials		259.25	10,439.61	10,698.86
Education Program		1,925.08	2,500.00*	4,425.08
Unit Council		4,024.67	24,410.06	28,434.73
Floral Hall			81,016.30	81,016.30
Rhododendron Trust			219.58	219.58
	25.00	14,877.33	140,826.97	$155,729.30

*Earmarked for Arboretum Library Fund

The Ancient Bristlecone Pine

Robert W. Cermak*

Most of the impressive trees in the West grow in the mild, moist climate and deep soils of the Pacific coastal region. Here are found the tallest, the largest, the most majestic of any of nature's living creations. Yet where great age is concerned, the lofy redwood, the stately Douglas-fir, even the giant Sequoia, must yield to the short, multi-stemmed, grotesque tree of the desert, the bristlecone pine. (Pinus aristata, Engelm)

The bristlecone pine is a five needled pine, one of the white pines. The needles are short and usually retained more than ten years giving the twigs a bottle-brush effect. The rich dark green of the needles contrast with the bright yellow staminate flowers and the purple cones.

The cones are about two to three inches long, and mature in two years. A thin, pointed bristle extends out and downward from the center of each cone scale giving the tree its name. Mature trees rarely exceed 35 feet in height and often have several stems some of which are dead.

The rugged aspect of the tree fits in well with its habitat. Bristlecone pine is a high elevation tree of the desert ranges of the Great Basin. Its best known home is the Ancient Bristlecone Pine Forest, in the bleak White Mountains of eastern California. Here the bristlecone pine form extensive groves at elevations from 10,000 to 11,500 feet and thrive despite strong, cold winds and moisture that averages only 13 inches annually. And it was here in 1954 and 1955 that Dr. Edmund Schulman and C. W. Ferguson of the University of Arizona Laboratory of Tree-Ring Research discovered the great age of these trees. Before their discovery the oldest known trees were the giant Sequoia which are known to reach 3,200 years of age.

The importance of the find lay beyond establishing a new patriarch among trees. To the dendrochronologist, scientists who study tree-rings, the response of these trees to their environment is equally important with their great age, for bristlecone pine are "sensitive". A sensitive tree to the tree-ring student, is one which responds to a wet or dry year by a change in growth ring characteristics, usually ring width. Many species growing in arid climates show this response. In contrast trees growing under wet conditions are "complacent", that is, show little change in ring width due to changes in precipitation. In effect, the sensitive and ancient bristlecone pine are a living climatic record extending in time 3,000 years beyond the Pyramids of Egypt.

How is this living record interpreted? A combination of corings with Swedish increment borers and small samples of wood are used to build a chronology of tree-rings from today far back in time. This is possible because tree-rings may be "cross-dated". Tree-rings from different parts of the tree or from other trees in the same area may be compared and the identical ring (and year) in each tree identified.

Cross-dating is the only way many older bristlecone pine can be dated. In their centuries long struggle with the elements parts of the original trees are worn away. The tree adds new stems which are in turn eroded until only a fraction of the original diameter is present. The researcher takes boring in various parts of the tree, overlapping one existing segment with a section from another part of the tree, cross-dating rings until the puzzle is solved.

Even more important, cross-dating allows rings in living trees to be matched with those of long dead trees. Dr. C. W. Ferguson and his associates at the Laboratory of Tree-Ring Research are continuing and expanding this phase of the project left by

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Dr. Schulman's death in 1958. They have established a continuous record of tree-rings from the present back beyond the dawn of history to 5500 BC, nearly 7,500 years into the past. A single billet of wood four feet long, lying on the ground in the Methuselah Grove was the link in this amazing record. Tree-rings from one of the living 4000 year old ancients matched the rings in this piece of float and the chronology was extended.

The significance of this ordinary looking scrap of wood explains why the Inyo National Forest prohibits the removal of any bristlecone pine, living or dead, from within the reserved area. One of these picturesque fragments could be the key which will extend tree-ring records back 10,000 years—to the last Ice Age.

What are the applications of tree-ring research? Archaeology, climatology, geology; these and other disciplines are using tree-rings as a historic scale. Dr. H. C. Fritts of the Laboratory of Tree-Ring Research and others have shown significant correlations between tree ring characteristics and rainfall. This phase of tree-ring study could be of immense importance to the water engineer, managers of large tracts of public and private land and to regional planners. The value of extended rainfall records grows with the rapidly increasing population of the Southwest. Perhaps clues to climatic cycles and the advance and retreat of the Ice Ages may one day be found in tree-rings from bristlecone pine.

Tree-ring chronologies have been an important tool to the archaeologist for many years. More recently, a radioactive isotope, Carbon-14 or radio carbon, has been used to date ancient ruins and artifacts. However, Carbon-14 is not a precise means of dating since the amount of the isotope present in the atmosphere varies. Precisely dated bristlecone pine wood is being used to calibrate radio carbon dates within the time range of the bristlecone chronology. This was clearly demonstrated when wood from a Swiss lake dwelling was dated using Carbon-14. When the calibrated Carbon-14 scale was applied to the wood, it showed the dwelling to have been built about 3700 B.C. or nearly 1,000 years earlier than was indicated by the radiocarbon dating alone.

Most visitors can sense an aura of timeless mystery about these rugged old veterans. Some marvel at the tenacity, the doggedness of these weather-beaten trees which can cling to life through a narrow band of bark and a few green twigs. Others are content to imagine the great events which took place after many of these trees were already old; the building of the pyramids of Egypt, the birth of Christ, Columbus' voyage.

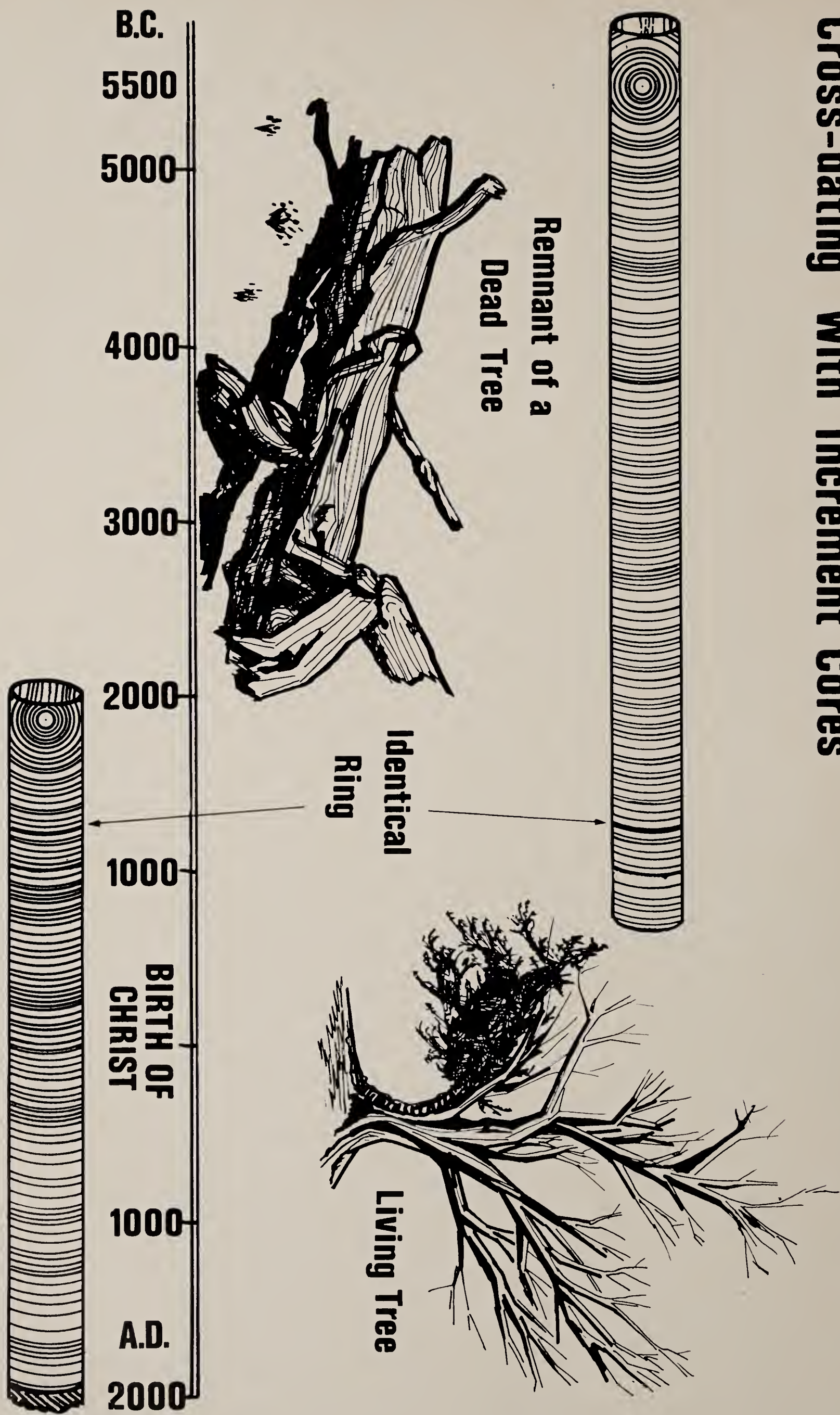
The backdrop for the bristlecone pine is the rugged White Mountain range, highest desert mountains in the country. The "rain shadow" of the High Sierra to the west makes an alpine desert of even the highest 13,000 and 14,000 feet peaks and plateaus. The bristlecone pine are limited mostly to dolomitic soils while sage, grass and flowers grow on sandstone soils. The relatively gentle southern slopes give access to the Ancient Bristlecone Pine Forest and beyond to three laboratories of the Navy's high altitude research program. The labs are operated by the University of California at Berkeley and one is located atop White Mountain Peak at 14,246 feet elevation.

Visitors to the Ancient Bristlecone Pine Forest are welcome during the recreation season. A large sign just north of Big Pine, California, points the way via Westgard Pass Road. The only water along the way is at Tool House about eight miles from Big Pine. The oiled White Mountain road turns north at Cedar Flat about fourteen miles from Big Pine. Along the road a few miles from the junction is the Fossil Area where exhibits and signs tell about 500-million-year-old coral-like animals which

(Continued on Page 71)

The Patriarch—largest bristlecone pine; its discovery by District Ranger Al Norden put tree-ring researchers on the track of the oldest trees.
Fig. 10 Photo by: E. C. Rockwell

PINE ALPHA



Above—
Cross-dating with Increment Cores.
Fig. 11 Sketch by: William Hauser

Pine Alpha—This 4,300-year-old tree was the first organism found to be over 4,000 years old.
Fig. 12 Photo by: E. C. Rockwell →

A Professional Horticultural Exploration of England and Scotland

PART IV

J. A. Witt

June 21

How wrong first impressions can be! My instant dislike of Liverpool gained by a bus ride through dirty streets (and perhaps because this was the home of the Beatles) has been changed to grudging admiration for a city trying to dig itself out of a mess and doing more than a fair job of it. We were escorted around by Mr. McCormick, Director of Liverpool Parks. The city has a fine and extensive park system that seemed well used by the public, clean, but with a somewhat worn look due in part to the industrial fumes and in part to a severe north wind that had scorched the foliage of numerous plants a few weeks earlier. I was most impressed with an esplanade developed along a formerly muddy bank of the Mersey River. Built on a garbage fill—shades of the Arboretum—it extended a distance of about three miles along the river bank and was planted with various wind resistant shrubs, especially *Olearia Haastii* and *O. macrodonta*, *Escallonia* species, *Tamarix*, and *Spartium junceum*, the Spanish broom. I couldn't help thinking how attractive this type of develop would along the Lake Washington ship canal.

The rains came just as we entered Calderstone Park, where the Liverpool Botanic Garden is located and prevented us from seeing much but the conservatory. Lunch was another of the leisurely affairs of five courses we have had so often when entertained by city officials. It will be hard to go back to a sandwich eaten between phone calls at my desk. The afternoon was spent in visiting various parks and plantings about this sprawling city. The Parks people are responsible for the development and maintenance of nearly all the open areas in Liverpool. Near the center of the city, above the dock areas which had been badly bombed in the war they were putting in a park of about 100 acres on land cleared of slum housing. This, I think, typifies the drive and vision of the city. Maybe the Beatles aren't so bad after all. It also seemed as if the city was very fortunate to have such dedicated and fine men in their park department.

June 22

We left Liverpool early in the morning, drove northeast through an industrialized England that soon changed to agricultural, then as we approached the Pennines, a low range of hills, it changed again into pastoral England. Our road climbed, dipped and wound among steep heather-clad hillsides with rushing streams, past what must have been ten thousand miles of stone fences dividing the countryside into small fields that held a few sheep. This was according to the erudite Mr. Powell "Bronte country". It was wild in a soft sort of way, but I imagine that it could be hard, cold and dangerous in the winter.

Our stop for the day was Harrogate, a spa town once famous for its 36 kinds of mineral waters, now a resort and convention center.

As a city that caters to tourist trade, Harrogate, in common with Brighton, has a very active park system. Mr. Bishop, the Director of Parks, was kind enough to show us through his domain. The main attraction was the Valley Gardens, a long, narrow and shallow valley from whose marshy bottom rose the mineral springs that furnished the spa with its waters. This was very nearly a botanical garden in itself as well as being a very lovely park. A small stream was beautifully planted with marsh-loving plants: *Primula* in variety, the Cali-

fornian *Peltiphyllum peltatum* and *Gunnera* species from Chile were only a few. My only criticism was the lack of labels. The plants were beautifully grown and very well displayed. I was most interested in one collection, a grouping of New Zealand plants, gifts to Harrogate from the city of Christchurch. They were in a sheltered area and the more tender species were taken into a cool house during the winter. This grouping of plants from one geographical area was a good one and well done. Rock gardens, screes, heather and heath gardens and even walls and pergolas for vines were all part of the park—as nice a small public garden as I have ever seen. Some rain marred the afternoon and nearly ruined our picture taking.

June 23

The rains of last evening really settled in and this morning was so wet we were unable to complete our scheduled visit to Harlow Car Gardens, the northern counterpart of the Royal Horticultural Society Gardens at Wisley. It is sponsored by the Northern Horticultural Society and was begun in 1947. The rain was coming down in such torrents that several of their paths had been washed out and even though we spent only a few minutes in the garden, we were soaked to the skin. What we did see was evidence of a well thought out garden with some fine rock work and execellent alpine areas.

We were very sorry not to be able to complete our stay there, but we were shown slides of the garden by Mr. Smith, the head gardener, and Mr. Bishop, the Director. Harlow Car Gardens would well be worth a visit again when the weather improved.

The afternoon was taken up by a long slow drive through the Yorkshire Dales, a repeat of the winding, hilly trip into Harrogate, but more so. Imagine the Saddle Moutains east of Ellensburg planted to heather, well watered and with granite and limestone outcroppings instead of basalt, lonely yet lovely in a somber way. These moors and dales of Yorkshire are something I should like to see again—on foot not on a bus.

The countryside softened as we went northwest then became rugged again near our stop for the night in the Lake country at Keswick.

June 24

We started north in a mist that soon turned into a real rain. Had a short shopping stop in Carlisle, then crossed into Scotland at Gretna Green. About mid-afternoon we arrived at Dawyck, the estate of Lt. Col. and Mrs. A. N. Balfour. These two most charming and gracious people met us in the rain and off we went to view their fantastic collection of trees and shrubs. Some of the older trees were planted in the late 18th century, and there were trees raised from seed collected by David Douglas in the eighteen twenties.

Many other specimens were strange to me, but Col. Balfour had been busy labeling his plants so, although we got wet looking for labels, we were able to identify most of the unknowns. Dawyck had many *Rhododendron* species planted beneath the larger conifers, and even though the climate must be harsher than ours, there were some fine specimens of the large leaved types such as *R. Macabeanum*, *R. grande*, and others.

Our time was so short that we were again forced to merely skim the surface of the wonderful collection and no time to study any of the more unusual plants. Still misting as we continued north to Edinburgh, our next stop, and much too dull for photography.

June 25

This day was one of the best of the trip so far. We spent the morning and most of the afternoon at the Royal Botanic Garden, Edinburgh, in the company of Dr. Fletcher and Mr. Kemp. This is certainly the finest garden we have seen: the collections are very well marked, grown to perfection and the entire garden is small enough to give one a feeling of belonging and big enough

to contain a truly good collection of plants. They are relatively dry—about ten to fifteen inches of rain less than we get—and much warmer in winter and cooler in summer. The latitude here is about that of Ketchikan, Alaska, yet the gardens abounded in *Eucalyptus*, *Nothofagus*, the more tender *Rhododendron* species; almost any plant from the temperate zones seems to thrive for them.

A newish demonstration garden with a series of plots was among the finest of its type I've ever seen. Each plot was well labeled and had very adequate explanation of what it was to demonstrate and showed the feature or principle in a clear and lucid manner. One was on pollination of plants, another on seed dispersal, others dealt with ground covers, hedges, plant families and so forth. Dr. Fletcher told us they were well received by the public and had considerable use. The rock garden at Edinburgh is world famous and I must admit that I was impressed. Very large—so big, in fact, that I got lost in it—and immaculately kept. It became plain how the grounds were maintained in such good order when I saw a husky young student gardener set a couple of fractious youngsters straight.

Late in the afternoon we joined the bus again for a quick tour of the city and its lovely parks, then a quick dinner and up the Edinburgh Castle to see a retreat ceremony complete with pipe bands.

June 26

Sunshine this morning as we left for Perth. We cross the Firth of Forth on its new bridge, past Loch Leven and into that city famous for its weaving and distilleries. We checked into the hotel then drove across town to "Branklyn" the private garden of Mr. Renton. As we met and talked with plantsmen on our tour we would often be asked what gardens we would be visiting—when we mentioned "Branklyn" the almost invariable comment would be "Oh yes! the finest two acres in the British Isles." I must agree that it was fine. Mr. and Mrs. Renton had put together a very complete collection of small ericaceous plants, fine specimen trees, brilliant beds of Meconopsis, including their own strains and hybrids, in full flower—all tastefully arranged in a compact garden with a cover of old orchard trees. We were only able to spend a short time there; to do it justice one would have to spend as many days as we spent hours.

After lunch our tour visited Drumkilbo, the garden and home of Lord Elphinstone. This was a young garden being built on the bones of an old neglected one. His Lordship is a keen gardener and the garden shows a great love of plants. About 5:00 p.m. we headed back for Perth the long way round—via Pitlochry, a small town on the edge of the Highlands. On the way down the River Tay—it was about 9:30 p.m.—I went into that semi-somnolent condition typical of bus riders, when I suddenly realized that I was seeing something very familiar. The bus might have been traveling along one of our western Washington rivers! The forests were of Douglas fir, western hemlock with a few western red cedars thrown in, and the thickets along the river bank contained maple and alder—just like home. Reforestation, of course, accounted for the trees since Pacific Northwest species do extremely well in this area. My reverie was broken and I was snapped back to Scotland when we were stopped by a local policeman to allow a small parade led by kilted pipers cross the highway.

June 27

Still it rains—mostly in showers with brief periods of sun between. Today's highlight was a visit with Major and Mrs. Knox-Finlay at their home and garden, Keilour Castle. The garden is situated on a piece of high ground through which two creeks (or burns) flow, joining near the home where they run through a very deep steep sided canyon. The grounds are well shaded with old trees, many from the Pacific Northwest and it is in the canyon and beneath the shelter of these trees that the Knox-Finlays

have built their famous gardens. It is a collector's garden with some of the most choice plant material we have seen on the trip. Major Finlay's interests are catholic but he is very keen on *Primula, Meconopsis* and *Nomocharis* all of which we saw in great profusion. Rain and lack of time kept us from really seeing the garden as we would have like to but we did dash through the extensive Rhododendron collection which consisted largely of species and very few hybrids. The precipitous sides of the canyons were so slick we didn't dare go down them but we could see that they were full of fine plants. The most obvious from the top were the brilliant Chilian flame trees, *Embothrium* species, probably *E. coccineum.*

Sterling Castle, much like Edinburgh Castle, held us for a few minutes, then we headed for Glasgow and arrived in that grimy seaport just in time to meet the going-home traffic.

June 28

Our day was spent largely with the Glasgow park department, touring this city of factories and shipping. Rather than go into details about the tour I will give some impressions. First, as with Liverpool, the city is working valiantly to overcome the very serious problems of overcrowding, old slum areas, and dirt. The parks department is busy activating many of the lesser used parks by removing restrictions such as "Keep off the Grass" and they find that more people are using these once neglected areas. They have also instituted a program aimed at young people which is certain to pay off in increased interest in parks in future years. Several old estates had been or were being converted into new parks. One, not yet open to the public, had perhaps the largest rock garden I've ever seen, large in that the red colored rocks were gigantic and formed into grottos, pools, labyrinths and similar structures and formations. Perhaps it was a garden of rocks rather than a rock garden.

From Glasgow to Troon was a very short run and we arrived on the Firth of Clyde in good time. Our hotel overlooked the Firth from the edge of an old, old golf course whose springy thick turf was the envy and despair of our grass expert, Dr. Ray Keen of Kansas State University.

June 29

We spent the morning in a long ride south along the coast, then inland to Newton Stewart and to Castle Douglas. The distance was about 100 miles and it took us four hours, an indication that the roads were not speedways. Our stop for the day was Threave School of Practical Gardening, an institution for training gardeners sponsored by the National Trust for Scotland. Students were trained here for two years and it is hoped that they will join a Trust garden when they graduate. The course of study differed very little from the other schools of its type we have visited but with a touch of Scottish flavor. For instance, they had a walled garden for vegetables and cutting flowers, a feature we saw very seldom further south.

Another long ride back to Troon took us over a high pass where we saw what I took to be *Erica cinerea* growing wild. However, it is difficult to botanize from the window of a moving bus so I could be wrong. The day was warm and clear for a change, and after we had dinner we walked down the beach until 10:30 p.m. and still had plenty of daylight on returning. I'll bet the winter days are as dark as the summers' are bright.

June 30

The last day at last—the three weeks which seemed so long at the beginning of the tour now seem like a few hours. Our bus was waiting for the last time to take us to Culzean Castle and gardens, another National Trust of Scotland property. On the way we passed Bobby Burns' cottage in Ayr, now a museum, crossed the River Doon and its famous Brig 'O Doon. Culzean Castle is a great stone mass built about the middle of the eighteenth century and

(Continued on Page 72)

Pedology

F. C. Ugolini*

Soil genesis or Pedology is the science dealing with soils as natural systems and the laws governing their formation and distribution. Although western societies had used soil since 4200 B.C. and the early writings on soil management go back as far as 3000 B.C.; it is less than 100 years since man recognized soil as an independent body in nature and became preoccupied with the process involved in the formation of soil. Before 1879 soil was thought mainly as a medium for plant growth and even the great German chemist, Liebig (1803-1873) failed to realize that soil was something more than an assemblage of rock fragments, weathered minerals and organic debris. Before 1879 soil studies were dominated either by agronomists or geologists. The agronomists looked at soil with a utilitarian interest, the geologists looked at soil as the product of rock weathering, a pathological condition of rocks.

It was a Russian scientist, Dokuchaev, that between 1879 and 1886 laid down the foundations of Soil Genesis or Pedology, thus freeing soil from the dominion of geology and agronomy. Before Dokuchaev, Fallow (1794-1887), a German lawyer whose hobby was mineralogy, recognized soil science as independent from agriculture and geology. Although Fallow is credited as the father of Pedology, his studies of soils still betrayed the geological approach; this point of view prevented him from reaching an understanding of the true genetic nature of soil.

Dokuchaev was a lecturer in mineralogy at the St. Petersburg University when he was appointed to make a 4 year study (1877-1881) of the Russian Chernozem (Russian Black earth). As a result of this original work and the soil survey of the Nizhnii-Novgorod province completed in 1886 Dokuchaev was able to develop three fundamental ideas that served as the basis for the new science of Pedology. The three concepts are:

1. The principle of geographicity
2. The concept of soil considered as an independent natural body.
3. The recognition of the factors of soil formation.

The principle of geographicity is the dependence of the character of a soil on its geographical position. Through his extensive travel, Dokuchaev observed that the distribution of granite, basalt, diorite rocks, and unconsolidated deposit (glacial, fluvial, and eolian) did not follow any geographical pattern. These rocks or deposits could be found in any geographical region from the Poles to the Tropics. However, soil distribution obeyed definite laws. Thus Dokuchaev observed that the Russian Chernozem were rather similar even if formed from different rocks or rock deposits. These findings not only prompted him to consider soils as an independent group of natural bodies, but also to distinguish the occurrence of soils in broad belts around the globe. These latitudinal belts coincided with the major climatic belts and were endowed with a definite flora, fauna, and soil types. The soils occurring within a belt were called zonal soils. The other contribution made by Dokuchaev was the formulation of the concept of soil. Soil was defined as a distinct body in nature endowed with specific morphological, chemical, physical and mineralogical characteristics determined by the combined effect of climate, parent material, organisms, relief, and time.

Dokuchaev after recognizing the soil forming factors (climate, parent material, organisms, relief and time) and their connection and interplay also recognized that these factors are not invariable establishing thus the concept of soil evolution. Soil evolves; soil is not a static body, but chang-

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*Mr. Ugolini is Associate Professor, Forestry, University of Washington.

es in response to changes of climate, organisms, topography and time. Because of the language barrier the ideas of Dokuchaev and their further amplification by his pupils and collaborators did not penetrate the western world before the First World War. Only in 1914 did a German scientist, Stremme, first translate into German the "Treatise on Soil Science" the monumental work of Glinka, a pupil of Dokuchaev. The German translation was in 1928 put into English by Marbut, head of the Division of Soil Survey, United States Department of Agriculture.

The ideas of Dokuchaev had a tremendous impact on the western world, and put an end to the chaos and confusion produced by the geological, agronomical and chemical approaches to soil studies. In the United States through the efforts of Marbut and Joffe (1886-1963), the first man to be named professor of Pedology in the United States, the Russian ideas were divulgated in the Federal and academic institutions. Today after almost a century, Dokuchaev's theories still withstand the test of scientific analysis and inquiry and his lucid deductions can still be of great inspiration to the young generations.

The Podological concept of soil as developed by Dokuchaev and the Russian School is pivoted on the soil itself, a body with specific morphological, chemical, physical and mineralogical properties. How does the soil body form? How does the soil acquire characteristics which are independent from the parent material from which the soil developed? Imagine a stream of elements, ions, molecules and compounds derived from the atmosphere, the hydrosphere, the lithosphere and biosphere permeating the soil material endlessly. In passing through the soil most of these elements, ions, molecules and compounds are involved in a number of reactions. These reactions tend to modify the parent material so that new characteristics are imposed. Because these reactions are concentrated in different parts of the soil system, these parts become enriched or depleted of different elements or compounds. With time the portion of the soil material on which the soil forming processes have been acting acquires definite color, composition, and structure. The localization of the soil forming processes, the ensemble of all the reactions, and the differential alterations of the initial material produce distinguishable zonation or layering which in Pedology are called horizons. These horizons have been referred to as genetic horizons in as much as they have been formed by Pedological processes. A collection of these horizons makes a profile. Thus a soil profile is an assemblage of horizons more or less parallel to the surface. The soil horizons constituting a profile were differentiated according to alphabetic letters: A, B, and C. The A horizon, the upper part one, was regarded as the eluvial horizon, the horizon from which substances were dissolved and removed. The B, was the horizon of illuvium where material was washed in from the surface. The C horizon was the parent material, the horizon the least affected by the Pedological processes. Once the division of a soil profile was accepted, profile descriptions became standard and comparable all over the world. The A, B, C nomenclature was derived from the Podzols, soils formed largely in humid-cold to cool climate under a forest cover. Not all the natural occurring soils display clear horizons as a Podzol does, however, their exterior morphology should not be confused with the degree of manifestation of the soil forming process.

The recognition of zonal soils had the unwritten implication that different processes were operating in the different zones. Furthermore there were soils not associated with any specific zone; these soils were called intrazonal. Intrazonal soils which are intermingled with the zonals owe their major characteristics to some local factors such as high water table or excessive soluble salts, or a particular rock composition. In an attempt to systematize the complex processes that occur in the zonal

and intrazonal soils a limited number of processes were proposed:

a) Podzolization
b) Gleing formation
c) Laterization
d) Calcification
e) Salinization

One must realize that these terms are actually collective terms for a large number of chemical, physical and biological processes. The nomenclature of these processes has derived after the names of natural occurring soils. Thus podzolization is the process responsible for Podzols formation.

Podzolization, laterization and calcification are the processes responsible for the formation of zonal soils; gleing formation and salinization and in some cases calcification are processes responsible for the development of the intrazonal soils.

Let us examine briefly these processes:

Podzolization: This process, at different degrees of intensity is responsible for the formation of a number of zonal soils—Arctic Brown, Podzols, Podzolic and Red-Yellow Podzolic soils. This process occurs generally in a humid-cold to cool climate and under a forest cover. Vigorous leaching is necessary and the process is favored if it is acting on acid, permeable parent material. The strong leaching produces an extremely acid A horizon and promotes the release and removal of bases, (calcium, magnesium, potasium and others) iron, and aluminum. Iron and aluminum are translocated into the B horizon where they tend to accumulate. In some instances organic material is also translocated into the B. Silica tend to accumulate in the A horizon. Clay particles are moved down and tend to concentrate in the B horizon.

Gleing formation: The process of gleing occurs under an excess of soil moisture. The Humic glei soils, the Ground-water podzols, the Bogs soils and the Planosols are examples of intrazonal soils affected by this process. Excess moisture in a soil results in low content of air, the proportion of oxygen decreases and an oxygen deficit appears. Under these reducing conditions iron become soluble and moves into the soil solution, the soil then loses its rusty-brown color and acquires a drab gray coloration. Microorganisms play an important role in dissolving ferric oxides. Because wet periods alternate with dry ones, oxygen can be replenished in the soil and the reduced iron be oxidized again. Due to these conditions the glei soils may show, red, yellow and brown streaks or spots.

Laterization: This is a process which is active in humid tropics and subtropics. The soils formed under the effect of laterization are called Latosols. This process is characterized by a rapid disintegration and decomposition of the parent material with release and removal of silica and separation and accumulation of iron and, to a lesser extent, of aluminum in the soil. Calcium, magnesium and other bases are depleted. The soil acquires an outstanding red color.

Lateritic soils are found not only in the tropics but also along the Atlantic seaboard of the United States.

Calcification: The zonal soils affected by calcification are the Chernozem (or Black earth) the Chestnut and the Brown. This process is active in the semiarid, arid regions covered with grasses. The process of calcification is the retention or the accumulation of pedogenic carbonates mainly calcium carbonate in the soil profile. The depth of the zone of carbonate concentration occurs at different depths as function of percolating waters. The effect of the calcium in circulation is to stabilize the organic matter which becomes less mobile and tends to accumulate imparting thus a black color to the soil. Aluminum and iron are also stable and they are not translocated.

Salinization: The process resulting in accumulation of soluble salts (sodium chloride, magnesium sulfate, sodium carbonate, etc.) in the soil is called salinization. This condition occurs for the most part in regions of arid and semiarid climates. Restricted drainage is a factor that usually

(Continued on Page 68)

20TH ANNUAL ARBORETUM FOUNDATION UNIT COUNCIL PLANT SALE AT THE ARBORETUM

WEDNESDAY – OCTOBER 4, 1967 – 9:00 A.M.

BONSAI

Rocks and available Plant Material
- AZALEAS – obtusum (Mystery)
- CONFIERS – Alpine
- MAPLES – Japanese
- PENTAPHYLLUMS
- PINUS MUGO
- RHODODENROMS – Dwarf

BULBS

Choice varieties of ALLIUM, ANEMONE, BRODIAEA, CAMASSIA, CALOCHORTUS, CHINODOXA, CROCUS, CYCLAMEN, CYPRIPEDIUM, ERANTHIS, EREMURUS, ERYTHRONIUM, FRITILLARIA, GALANTHUS, LEUCOJUM, IRIS, MUSCARI, NARCISSUS, SCILLA, TRILLIUM, TULIPA. Special list with prices for advance orders will be sent on request. Call EAst 5-4510 or write – Arboretum Foundation, c/o U. of W. Arboretum, Seattle 98105.

FERNS

ADIANTUM PEDATUM – Maidenhair – soft feathery foliage to 1'.
ASPLENIUM TRICHOMANES – Maidenhair Spleenwort – Large
ATHYRIUM FILIX-FEMINA – Lady Fern – decid. with lacy fronds 3–4"
BLECHNUM SPICANT – Deer Fern – narrow, leathery everg. fronds 3½'
CHEILANTHES DENSA – small Rock Fern
- C. GRACILLIMA – Lip or Lace Fern fronds 4–12" long compact

DRYOPTERIS IZETTA MARIE – Wood Fern hybrid
- D. GYMNOCARPIUM – Oak Fern

ENGLISH CRESTED FERN
PHYLLITIS SCOLOPENDRIUM – Hart's Tongue – 6–18"
POLYSTICHUM VIVIPERUM – fronds 12–18" long 4–6" broad
- P. LEMMONI I
- P. MUNITUM – Sword Fern – Leathery Shiny dark green fronds

UNUSUAL HARDY FERNS

CHEILANTHES LANOSA – from Oregon Mts.
CRYPTOGRAMMA CRISPA ACROSTICHOIDES– Parsley Fern – N.W. 6–12" decid.
LASTREA PSEUDOMAS CRISPA CRISTATA – dwarf compact crisp crested fronds
LINEARIS POLYDACTALA – lacy foliage fingerlike crests at tips
OSMUNDA REGALIS – Royal Fern – large to 6'
POLYSTICHUM ANDERSON I – rare N.W. Native

GROUNDCOVERS

AETHIONEMA – Stonecress – perennial choice little shrublet
ACAENA GLAUCA – Sheer Bur – trailing large loose mats soft gray-green lvs.
ANDROMEDA POLIFOLIA – everg. to 1' fls. pink May-July
ARCTOSTAPHYLOS MEDIA – to 2' fast spreading dark green lvs.
- A. UVA-URSI – Kinnikinnick – native prostrate everg. fls. white to pink Apr.

ARMERIA SAPHOLUTUS RUBRA – hardy everg. dense globular fls. narrow stiff lvs.
CEANOTHUS GLORIOSUS – shrubby matlike – fls. lavender blue
COTONEASTER DAMMERI – everg. trailing – fls. white May-June red frts.
- C. LOFAST – very hardy low and fast growing Hopkins cross
- C. MICROPHYLLA – everg. trailing white fls. red frts.
- C. SALDAM – spreading fast growing everg. bright red berries
- C. TOM THUMB – everg. most prostrate variety – red berries

CYTISUS DECUMBENS – prostrate broom creeping to 8" fls. bright yellow
EPIGAEA REPENS – trailing Arbutus stems to 1" everg. fls. pink-white Apr.-May
EPIMEDIUM PINK – low growing nearly everg.
EUONYMUS FORTUNE I 'KEWENSIS' – trailing-climbing very small lvs.
- E. FORTUNEII VARIEGATA – everg. trailing variegated lvs.
- E. PATENS 'DUPONT' – everg. compact fast growing dark green lvs.

GAULTHERIA HUMIFUSA – everg. to 4" fls. white spring scarlet frts.
- G. ITOANA – everg. 6–7" fls. white, white or pink frts.
- G. MIQUELIANA – everg. 6–12" fls. white June-July frts. Sept.-Oct.
- G. OVATIFOLIA – N.W. spreading everg. to 1' fls. white scarlet frts.
- G. PROCUMBENS – everg. creeper 6" fls. white green-bronze lvs.

GENISTA LYDIA – cushion forming dwarf 2–3' across fls. Yellow May-June
- G. PILOSA – very low growing to 1½" 8" wide fls. yellow short clusters

GENTIANA ACAULIS – low growing to 4" fls. dark blue dark green lvs.
HEBE BUXIFOLIA – stiff everg. fls. white late summer box-like lvs.
- H. CUPRESSOIDES – everg. slow growing to 5' cypress-like lvs.
- H. GLAUCOPHYLLA – everg. broad rounded compact fls. white dense clusters

HEUCHERA RED PIMPERNEL – compact everg. fls. bell-shaped scalloped lvs.
ILEX CRENATA HELIERI – everg. dwarf compact black frt.
LEIOPHYLLUM BUXIFOLIUM – upright to 18" everg. fls. pink to white

NANDINA – dwarf – Heavenly Bamboo – semi-decid. slow growing
PACHISTIMA CANBYI – dwarf. everg. mat 9–12'' dark green narrow lvs.
PACHYSANDRA TERMINALIS – hardy everg. fls, white spikes dark green lvs.
PENSTEMON BARRETTAE – fls. rose spikes leathery blue-green lvs.
PHLOX NIVALIS – trailing – fls. pink or white clusters narrow everg. lvs.
PIMELEA COARTICA – spreading everg. Daphne-like hugs ground fls. white
SANTOLINA CHAMAECYPARISSUS – many branched fls. yellow globose – gray white lvs.
SEDUM SPECTABILE – succulent upright spreading fls. pink lvs. blue-green
VIBURNAM DAVIDII – everg. white fls. to 3'' lvs. dark green veined 6''
V. OPULUS NANUM – decid. dwarf lvs. dense red twigs in winter
VINCA MINOR 'BOWLES BLUE' – form with exceptionally fine blue colored fls.

HEATHS & HEATHERS

Many varieties of CALLUNA, ERICA, DABOECIA –summer and winter blooming FALSE HEATHers, CASSIOPE, PHYLLODACES

HERBS

Culinary; BUSH BASIL, BORAGE, FENNEL, POT MARJORAM, WINTER SAVORY, THYME, TERRAGON, FRENCH SORREL, SALAD BURNET, LOVAGE. Also aromatics: MINT, LAVENDER, PARSLEY, CHIVE, ROSEMARY and SAGE

JAPANESE GARDEN MATERIAL – A list of suitable materials and departments in which they can be bought will be at the Education Table.

PERENNIALS

LUPIN, red, pink and apricot, PYRETHRUM (Painted Daisy) red and pink, ESTHER REED DAISY white, ORIENTAL POPPY red, pink and orange, DELPHINIUM Pacific Hybrid, GYPSOPHILA BRISTLE FAIRY, PHLOX red and pink shades, MARGUERITE yellow, HOLLYHOCKS

RHODODENDRONS AND AZALEAS

SPECIES

ABERCONWAYII – white, saucer sh. flws., 8'
ARBOREUM – red, indumentum, early, 40'
ARIZELUM – white or yellow, indumentum
AURICULATUM – white, scented, late
BRACHYANTHUM VAR. HYPOLEPIDOTUM – yellow
BUREAUVII – leathery fol., rust indumentum
CAERULEUM ALBA – wh., crimson blotch
CAESIUM – yellow, bluish lvs., 4'
CALLIMORPHUM – Ihrig's rose form
CALOPHYTUM – white or pink, imposing fol.
CAMTSCHATICUM – dwf., dec., reddish purple
CAROLINIANUM – pink & white forms, 6'
CHAMAETHOMSONII – red, 3'
'' var. CHAMAETHAUMA – smaller lvs.
CHAMEUNUM – reddish purple, upright, 2'
CINNABARINUM VAR. BLANDFORDIAFLORUM
CONCATENANS – apricot tinged purple, glaucus
CONCINNUM VAR. PSEUDOYANTHINUM – wine red
DAVIDSONIANUM – wh., pink and red-blotched forms
DEGRONIANUM – narrow lvs., indumentum. Japan
DESQUAMATUM – scaly lvs. to 3½'', early
DICROANTHUM VAR. SCYPHOCALYX – orange
ELEAGANOIDES PINK AND WHITE – low, June
FASTIGIATUM – like R impeditum, but upright
FORRESTII VAR. REPENS – prostrate, red
''SCARLET RUNNER – clone of above, sun
FULGENS, DARK RED FORM – early
GLAUCOPHYLLUM AND GLAUCUM VAR. SHERRIFFI
GLOMERULATUM – lilac flws. in clusters, 3'
GYMNOCARPUM – crimson, fawn indumentum, 4'
HAEMATODES – blood red, tomentose, shade
HANCEANUM NANUM – yellow, dwf. April
HIRSUTUM – rosy pink, June, hairy lvs.
IMPERATOR – prostrate, lge. pink flws.
IRRORATUM – flws. usually speckled, early
KELETICUM (Rock) – dwf., purplish crimson
KOTSCHYI – rose pink, late
LACTEUM – yellow, fawn indumentum, rare
MACABEANUM – lge. lvs., indumentum, yellow
MEGERATUM – yellow, low, bristly lvs.
MUCRONULATUM – dec., very early, rose purple
NERIFLORUM SEEDLINGS – crimson, variable H.
NITENS – pinkish purple, dwf., late
PROSTRATUM – crimson or rosy, flat
RADICANS – prostrate, tiny lvs., purple
REX – lge. lvs., indumentum, wh. or rose
SALUENSE – rose or purple red, dwf.
SCINTILLANS – lav. to purple, erect, 3'
SEARSIAE – pink, 3', June
SEMILUNATUM – yellow, dec., hairy lvs., 3'
SUTCHUENENSE – rosy pink, early, 20'
THOMSONII – blood red, lge. calyx, 20'
TRICOSTOMUM VAR. LEDOIDES – pink, twiggy
UNIFLORUM – dwf., lge. flws., purple
VILLOSUM (now Tricanthum) – hairy lvs.
VIRIDESCENS – yellow green, June, 4'
WARDII (Cox) – lemon yellow, glossy lvs.
WILTONII – pink, lvs. deeply veined, 10'
YAKUSIMANUM – seedlings, FCC and Exbury forms

AVAILABLE IN LIMITIED QUANTITIES:

AMESIAE
ARGYROPHYLLUM
BRACHYCARPUM
CAMPANULATUM VAR. AERUGINOSUM KNAPHILL VAR.
CAMPYLOCARPUM
CALOSTROTUM (Rock)
CEPHALANTHUM WHITE

CHAPMANII
CHASMANTHUM
CHRYSANTHUM
CLEMENTINAE
CRASSUM
DIDYMUM
EDGARIANUM
ELLIOTTII
EXIMIUM
EXQUISITUM
FALCONERI
FLAVIDUM
HEMSLEYANUM
HODGSONII
HUNNEWELLIANUM
HYPERYTHRUM
KYAWI
LANIGERUM
LEPIDOSTYLUM
MICROLEUCUM
ORBICULARE
OREOTREPHES
PREPTUM
RUBIGINOSUM
SINOGRANDE
TEPHROPEPLUM
TSANSPOENSE VAR. PRUNIFLORUM
VALENTINIANUM
VENATOR
VERNICOSUM VAR. RHANTUM
WIGHTII

ALSO:

*AUGUSTINII, CAMPYLOGYNUM VARIETIES, *CILIATUM, HIPPOPHAEOIDES, *IMPEDITUM, *INTRICATUM, *KEISKII, LEUCASPIS, *LUTESCENS, MOUPINENSE, PEMAKOENSE, PUBESCENS, *RACEMOSUM, WILLIAMSIANUM, * YUNNANENSE

* denotes special forms included

CHOICE CREATIONS FROM OUR NORTHWEST HYBRIDIZERS!

MANY NEW AND RARE ITEMS!

LESTER BRANDT

BLOOD RUBY – 3', red, good foliage
CARMEN X CHOREMIA – s.c., red, hose in hose
CARMEN X MAY DAY – low, scarlet, May
CLARA WEYERHAUSER – exciting orange
DICHROANTHUM X SCYPHOCALYX – new, red
FALCONERI X MRS. HENRY AGNEW – s.c., cream
FIONA – 4'' pink flower, 8–10 to truss, 5'
FLAVIDUM X LADY ROSEBERRY – golden, choice
LITTLE JOE – prostrate, waxy red
MACABEANUM X GRANDE – s.c., silvery indumentum, large leaves
MOOD INDIGO – blue, compact, sm. leaf
NAOMI EXBURY X NUGGET – s.c., cream – ylw.
NECTARINE – apricot to salmon, 5'
OTHELLO – deep red, 3', May
REVE ROSE – dwarf, rose, May
THALIA – fragrant white, 3'
THOR – indumentum, beautiful red
TREASURE – (remake) 6'', dark pink
XANTHOCODON X LADY ROSEBERRY – s.c., apricot, yellow shaded bells

JAMES CAPERCI

CANDI – bright rose, 18''
CAROUSEL – lavender pink, spotted throat
DEBBIJO – lavender purple, spotted throat
DUSTY-MAY – 1', dusty rose
LITTLE JOE X DEVONSHIRE CREAM – cream bell
MARICEE – creamy white, floriferous
PATRICIA – deep Magnolia purple, 1'

JOHN HENNY

CARMEN X MAY DAY – low, scarlet red
COTTON CANDY – huge pink truss, 5½'' flwrs.
FULL MOON – fine clear yellow, 3'
MARGARET DUNN VAR. GOLDEN BELLE – deep yellow flushed shell pink, May

RUDOLPH HENNY

CAVALIER – red, neat foliage and habit
C.I.S. – crimson, yellow, cream blend
HONEY – buff fading paler, 1', April
JADE – pink and orange becoming greenish yellow, late May

BEN LANCASTER

BLUETTE – hyacinth blue, 2', April
EASTER BELL – white dwarf
GOLDEN GLOW – 2', yellow edged chartreuse
ROSE ELF – large pink flwrs., dwarf

HALFDAN LEM

ANNA – deep pink filled, 12 flower truss
ANN CAREY – chartreuse to coral pink
C. P. RAFFILL X WILLIAMSIANUM – 2', strawberry pink, nice foliage
DIDO X WILL. – orange, compact shrub
DIDO X WILL. – peach, late April
DIDO X WILL. – pink, 2', nice foliage
FABIA X BUREAVII – beautiful indumentum
JINGLE BELLS – waxy red-orange, low
KING OF SHRUBS X WILL. – salmon pink
SEATTLE GOLD – lg. yellow gold flwrs.
NO. 124 OF DON McCLURE – award winner, pale pink flwrs., chartreuse markings

BEN NELSON

DESQUAMATUM X CILIATUM – s.c., pure white
RUSSAUTINII X – excellent blue

ENDRE OSTBO

EDWARD DUNN – apricot, 4'
ENDRE OSTBO – blush pink streaked rose
HELEN JOHNSON – flesh pink blends, 4'
JANE ROGERS – carmine pink with chocolate blotch, late, 5'
KING OF SHRUBS – apricot yellow, 3'
MRS. DONALD GRAHAM – ruby red and rose
OLYMPIC LADY – white, 4¼'' flowers
OSTBO'S LOW YELLOW – creamy yellow
PHYLLIS BALLARD – orange red, 4'' flwrs.
YELLOW NO. 1 – very good yellow

THEODORE VAN VEEN

AUTUMN GOLD – apricot salmon shading to light pink, striking
EVENING GLOW – pure deep yellow, large flowers and compact habit
LUCKY STRIKE – deep pink funnel shape
OLD COPPER – bell shaped copper blooms

s.c. = seedling cross

SOMETHING FOR EVERYONE! ALL COLORS, ALL SIZES! THE BEST HYBRIDS AVAILABLE!

Albatross
Angelo
Anna Rose Whitney
Audyck's Purple
Carmen
Creeping Jenny
Cutie
Carolyn Grace
Conemaugh
Cream Crest
Damaris
Day Dream, biscuit fm.
Dora Amateis
Eldorado
Electra
Elizabeth Hobbie
Emasculum
Ethel
Faggetter's Favorite
Francis Hanger
Frank Galsworthy
Fusilier x strig.
Golden Horn
Gene
Helene Schiffner
Idealist
Ilam Violet
Impeanum
Impi
Jacksonii
Joanita, Reuthe fm.
John Coutts
Kluis Sensation
Lady Berry
Lamplighter
Lavender Girl
Lee
Little Ben
Lod. King George
Lod. Patience
Lod. Pink Diamond
Lod. White Diamond
Lucy Lou
Maryke
Moerheim Beauty
Mrs. Mary Ashley
Mrs. Tom H. Lowinsky
Naomi Exbury
Naomi Glow
Naomi Nereid
Nobleanum Venustum
Ole Olson
Pilgrim
Pixie
Princess Elizabeth
Quaver
Queen of Hearts
Queen of the May
Remo
Scarlet Wonder
Silkcap
Sir Charles Lemon
Snow Lady
Snow Queen
Spinulosum
Temple Belle
Tessa
Valaspis
Vanessa, F.C.C.
Vanessa Pastel
White Swan
Wilbar
Yeoman

ALSO THE FOLLOWING FAVORITES

Arthur Osborn, Azor (selected form), Blue Diamond, Bluebird, Bobolink, Bo-peep, Bowbells, Bric-a-Brac, Brocade, Carita, Cilpinense, Corona, Cowslip, C. B. Van Ness, Daphnoides, Dormouse, Elizabeth, Harvest Moon, Hummingbird, Jan Dekens, Jock, Lord Roberts, Moonstone, Mrs. A. T. de la Mare, Mrs. Betty Robertson, Mrs. E. C. Stirling, Mrs. Furnival, Praecox, Rainbow, Sapphire, Susan, Thom-williams, Unique and Yellow Hammer.

AZALEADENDRONS: Broughtonii Aureum, Galloper Light, Martha Isaacson and Odoratum.

DECIDUOUS SPECIES AZALEAS: arborescens, canadense, quinquefolium and schlippinbachi

CHOICE NAMED EXBURY AND KNAPHILL DECIDUOUS AZALEAS

Altair
Annabella
Ballerina
Balzac
Beaulieu
Berry Rose
Brazil
Buzzard
Cecile
George Reynolds
Gibraltar
Ginger
Golden Dream
Homebush
Inspiration
Kathleen
Marina
Oxydol
Silver Slipper
Strawberry Ice
Wryneck

EVERGREEN AZALEAS

SATSUKI HYBRIDS: Low growing, very late, flowers single and usually varigated to some degree.

Shinnyo-no-tsuki
Seigetsu
Gunrei
Bunkwa
Row-getsu
Myogi

WHITE

Mucronatum var. Noordtianum
Mucronatum var. Sekidera
White Squall
Moonbeam
Hakatashiro
Rose Greeley
Glacier
Chichibu
White Gumpo
Everest
Niagara

PINK

Sweetheart Supreme
Rosebud
Twenty Grand
Pinky Pearce
Fedora
Barbara
Glamour
Gaiety
Red Gumpo
Pink Gumpo
Lorna
Pixie

CORAL, SALMON & ORANGE

Garda Joy (H-12-G)
Mrs. L. C. Fischer
Nancy
Balsaminaeflorum
J. T. Lovett
Oldhami
Buccaneer

RED

Stewartstonian
James Gable
Hino-crimson
Dragon
Sherwood Red

LILAC

Purple Splendour
Progress

TREES & SHRUBS

ALBIZZIA JULIBRISSIN – Silk Tree – decid. rapid growth to 40' fls. pink
APPLE – Dwarf combination – Gravenstein, King Lodi, Golden Delicious
ARBUTUS UNEDO COMPACTA – smaller, bushier form of Strawberry Tree frts. early
ARCTOSTAPHYLOS COLUMBIANA – Pac. Coast everg. 3–10' fls. white to pink
ACUBA JAPONICA – everg. 6–10' fls. Mar. lush lvs.
A. J. VARIEGATA – lvs. speckled yellow
A. J. AUGUSTIFOLIA – long narrow lvs.
AZARA MICROPHYLLA – everg. 12–18' fls. fragrant Feb.-Apr. glossy lvs.
BERBERIS THUNBERGI I – decid. lvs. bright in fall red bead-like frts.
BETULA ALBA EUROPEA – decid. to 60' pendulous – grown in groups
CAMELLIA J. C. WILLIAMS – medium single cup-shaped fls. phlox pink
C. MADONA – fls. large white numerous bright pink stripes
CEANOTHUS DIGNITY – blue fls. summer large everg. shiny lvs.
C. IMPRESSUS 'PUGET BLUE' – everg. upright 8–9' fls. gentian blue Apr.
C. OLYMPIC LAKE – new Arboretum form low spreading to 2' fls. blue spring
CERCIS CHINENSIS – decid. fls. rosy purple lvs. glossy green lined edge
CHAMAECYPARIS OBTUSA – everg. to 50' spreading dark glossy green lvs.
CHOISYA TERNATA – everg. 6–8' fls. white clusters spring lvs. yellow-green
CLERODENDRUM TRICHOTOMUM – decid. white fls. late summer blue-green frts.
CORNUS FLORIDA WELCHII – 10–12' variegated pink, red and white lvs. good fall color
C. KOUSA – decid. 25' fls. bracts creamy-white May-June
C. K. CHINENSIS – Decid. 25' fls. bracts creamy-white May-June
C. MAS – decid. to 10' fls. yellow clusters Feb.-Mar. scarlet frt.
CORYLOPSIS PAUCIFLORA – decid. 6' spreading primose yellow fls. Feb.-Mar.
CRYPTOMERIA JAPONICA 'ELEGANS' slow to 25' grayish green foliage color in winter
DAPHNE ODORA – everg. spread 4' fls. pink fragrant clusters spring glossy lvs.
DAPHNIPHYLLUM MACROPODUM – everg. compact habit rhododendron-like foliage
ELAEAGNUS EBBINGEI – everg. spreading 12' fls. white autumn frts. May
E. PUNGENS 'VARIEGATA' – everg. large sprawling yellow edged
EMBOTHRIUM COCCINEUM LONGIFOLIUM – everg. fls crimson scarlet May-June
ENKIANTHUS CERNUS RUBENS – similar to E. campanulatus with deeper colored fls.
EUCALYPTUS PERRINIANA – tree with "silver dollar" lvs.
EUONYMUS ALATA MONTROSA – same as E. compacta but bigger heavy corky ridges
FORSYTHIA OVATO TETRAGOLD – spec. form extra large gold fls. 1" across
FORTUNELLA JAPONICA (KUMQUAT) – small everg. fruit tree to 12' hardier than orange
FRANKLINA ALATAMAHA (GORDONIA) – decid. small tree cup-shaped white fls. autumn
ILEX AQUIFOLIUM ANGUSTIFOLIUM – Holly narrow pyramidal habit – shiny green lvs.
I. CRENATA CONVEXA – slow growing almost round lvs. black berries
ITEA ILICIFOLIA – everg. to 10' holly-like lvs. 4" fls. greenish white racemes
KOELREUTERIA PANICULATA – decid. to 30' fls. yellow 14" panicles July-Aug.

LEUCOTHOE DAVISAEI – everg. to 3' fls. white June
LIRIODENDRON TULIPIFERA – decid. to 80' fls. tulip-like lvs. yellow in fall
MAGNOLIA GRANDIFLORA 'ST. MARY'S' – everg. superior form fls. fragrant early
M. LILIFLORA NIGRA – decid. to 15' fls. dark purple pinkish within
M. VEITCHI – decid. to 45' fls. bluish-pink Apr. one of finest hybrids
MAHONIA LOMARIIFOLIA – everg. 7–8' fls. spikes of rich yellow Oct.-Nov.
MYRICA CALIFORNICA – Pacific Wax Myrtle everg. 15' ornamental frt.
NANDINA DOMESTICA – everg. to 8' fls. white panicles June.-July red frt.
NYSSA SYLVATICA – decid. to 30-100' bright scarlet in autumn
OSMANTHUS DELAVAYI – everg. to 6' fls. white in panicles Apr. frt. bluish-black
O. ILICIFOLIUS ROTUNDIFOLIUS – rounder lvs. and more dwarf than type
OXYDENDRUM ARBOREUM – Sorrel Tree decid. to 70' terminal sprays white fls. late
PACHISTIMA MYRSINITES – everg. native 2–4' purplish or greenish fls. Apr.-June
PARROTIA PERSICA – decid. shrubby to 16' lvs. like witch-hazel colorful in fall
PAULOWNIA TOMENTOSA – Empress Tree – decid. 40' fls. violet dark-spotted
PERNETTYA MUCRONATA – everg. 3' pollenizer for berries pink or red
PHOTINIA FRASERI – everg. to 12' new promising hybrid foliage shining
PICEA PUNGENS – Colorado Blue Spruce foliage from dark to all shades blue-green
PINUS ARISTATA – low shrubby pine short needled sprinkled with white resin
P. CEMBRA – slow growth very hardy dense regular foliage good in small gardens
P. MUGO PUMILIO – fine dwarf form purple cones turning brown good in rockeries
P. MUGO – slow to varieable heights needles dark green stout
P. PENTAPHYLLUM – low widespreading short twisted lvs. cones profusely
P. SYLVESTRIS – picturesque growth needles blue-green stiff reddish bark
PRUNUS PISSARDII 'HOLLYWOOD' – beautiful small tree fls. pale pink Feb. frt. rosy-red
P. P. 'NEWPORT' – purple leaf plum decid. single pink fls. fruits well
P. P. 'THUNDERCLOUD' – more rounded form coppery lvs. fls. pink-white red frts.
P. P. 'WOODI' – first of the flowering plums to bloom single pink
P. SUBHIRTELLA AUTUMNALIS – to 20' spreading fls. soft pale pink thru winter
P. S. 'WHITCOMBI' – larger than above fls. deep pink early excellent
P. SERRULATA SHIROFUGEN – tall horizontal branches pink double fls. spring
P. S. SHOGETSU – low broad fls. pale pink double prolific early spring
RAPHIOLEPIS UMBELLATA OVATA – fls. white fragrant roundish leathery lvs.
RHUS COTINUS COGGYGARIA – decid. fls pink upright panicles lvs. yellow-orange fall
R. C. C. 'PURPUREA' – purple Smoke Tree – dark red lvs.
SARCOCOCCA RUSCIFOLIA – everg. fls. Jan.-Mar. white Hidden in lvs. waxy-green
SCIADOPITYS VERTICILLATA – Umbrella Pine –Distinctive needles bronzy-green whorls
SKIMMIA JAPONICA – everg. 2–3' fls. Apr.-May frt. white all winter
STEWARTIA MONADELPHA – decid. to 30' fls. white July frt. beaked Sept.-Oct.
S. PSEUDOCAMELLIA – to 40' decid. fls. white anthers orange July-Aug.
STRANVAESIA DAVIDIANA – everg. wide spreading white fls. Showy red berried
S. D. UNDULATA – everg. prostrate fls. white clusters June frt. red-orange
STYRAX JAPONICA – decid. 30' fls. pendulous white June-July
S. OBASSIA – decid. 30' fls. in racemes June-July lvs. round to oval
TSUGA CANADENSIS PENDULA – pendulous hemlock mound-like spreading form
T. MERTENSIANA – native twisted foliage blue-green silvery cast
VACCINIUM OVATUM – everg. fls. pinkish-white Mar.-May lvs. leathery lustrous
VERONICA SPICATA – clumps to 2' fls. deep blue mid-summer
VIBURNUM BODNANTENSE – decid. 11' fls. pink fragrant Oct.-Mar.
V. OPULUS – decid. 15' fls. white June fall color excellent red berries
V. ODORATISSIMUM – everg. 20' fls. white clusters May lvs. glossy green
V. TOMENTOSUM – decid. 12' flat white flower trusses upperside of branches.

VINES

Assorted Rare including CLEMATIS, HONEYSUCKLE, WISTERIA, PASSION AND TRUMPET VINES.

SPECIAL ORDERS

Mrs. Neil Thorlakson
2020 79th N.E.
Bellevue, Washington 98004
GL 4-0202

OR

Mrs. John Peterson
7710 S.E. 22nd
Mercer Island, Washington 98040
AD 2-8046

REMOVE THIS SECTION AND BRING IT WITH YOU TO THE SALE!

Caesalpinia (Poinciana) Gilliesii

B. O. Mulligan

For a number of years we have grown this shrub, a native of Argentina and Chile, planted in a small bed in the west greenhouse where it has flowered annually, though becoming of straggling habit and having to be tied to one of the steel supports of the house.

In May, 1962, however, we had some young plants in pots raised from seeds given us by Mr. Carl English, Jr. of Seattle, which he had collected near Tucson, Arizona, where this species has become naturalized as in other parts of that state, southern Texas and New Mexico, and where, as in California, it is called Bird-of-Paradise flower. One of these plants was set out in June 1964, against the south wall of the Arboretum garage, protected by other plants on both east and west sides; here it grew well in 1965 and 1966, and this year both pleased and surprised us by producing fifteen of its very handsome inflorescences at the end of June and in early July (fig.). The plant is now approximately eight feet in height.

The flowers are remarkable for the contrast in color between the butter yellow corolla, about 1-1/2 inches long, and the protruding red stamens and style more than double that length. The foliage, which is doubly pinnate, is composed of many, very small elliptical leaflets and to a casual glance looks like one of the Australian acacias, although in reality this plant is much more closely related to the honey locusts, genus *Gleditsia*, of which we grow several species.

The seed pods of the *Caesalpinia*, however, only reach 3-4 inches in length, as compared with the 12-18 inches of *Gleditsia triacanthos*. It is to be hoped that we can raise another generation of plants from this one and give it a trial in other locations around Puget Sound and in the Pacific Northwest.

Caesalpinia Gilliesii flowering on south side of garage at Arboretum.
Fig. 13 Photo by: B. O. Mulligan

The John Fitzgerald Kennedy Memorial Arboretum and Forest Garden

A. M. S. Hanan*

Background:

Although there are many fine collections of trees and shrubs in Ireland these are widely scattered, and there has been a long-felt need for a comprehensive collection with adequate facilities for research and study. Thus in 1964 when it was decided to provide a living memorial to the late President Kennedy, it was felt that it should take the form of a Park, incorporating an Arboretum and Forest Garden, to be called the John Fitzgerald Kennedy Memorial Park.

This project was financed jointly by Irish-American contributions and the Irish Government.

Objectives:

1. To provide a comprehensive, scientifically laid-out and fully documented Arboretum with ancillary collections and relevant information service.
2. To establish a series of forest plots in the form of a Forest Garden, which could provide silvicultural knowledge of a wide range of species, and demonstrate the characters of these species when grown under forest conditions.
3. To mould these two objectives into an amenity park, in which every effort would be made to stimulate in the public a more enlightened use of woody plants.
4. To build up an adequate reference library and information service in all matters connected with the growing of trees and shrubs.

Sites:

The Committee was fortunate in acquiring an area of very good agricultural land consisting of 410 acres in County Wexford which is in the south-east corner of Ireland, ten miles from the sea.

The terrain is gently sloping towards the south-west between 120 and 600 feet above sea level. An intensive soil survey carried out by an Agricultural Research Institute found the site to be very suitable to tree growth, being mainly a good "brown-earth", 12-24 inches in depth. The pH had a fairly constant value throughout, of about 6.2. The underlying rock is a schist of Ordovician (Palaeozoic) origin.

The climate is also considered favorable, with an average rainfall of 40 ins. per annum. There is, relative to Ireland generally, a high daily duration of bright sunshine, the percentage of possible bright sunshine being in the region of 35%. It is hoped that these factors, combining with the moderating influence of the Gulf Stream, will provide a climate very favorable to a wide range of species. Exposure to the prevailing south-west winds may cause problems in the early years but it is hoped to provide adequate shelter to lessen the effects of these winds. The one imponderable, however, is the danger of late spring frosts. The average date for last screen frosts (1911-1930) was April 1st, but it is fully recognized that this is only an average and that later frosts do frequently occur in Ireland during the growth season. The build-up of mutual shelter may lessen the risk of damage.

ARBORETUM

Extent: About 269 acres of the more low-lying parts of the Park have been dedicated to the arboretum project. Most of this land is at present under grass, mown almost to lawn condition; but some existing old woodlands have been included too.

Site preparation: All necessary fencing,

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*A paper presented by Mr. Hanan who is in the Research Branch of the Forestry Division, Department of Lands, at the Symposium on the Biology of Woody plants held at Nitra, Czechoslovakia, May 10-17, 1967.

drainage, ditch-levelling etc., are now almost finished and planting of the specimens will start in the 1967-68 season. Boundary and internal shelter have been provided, using a wide variety of evergreen and deciduous trees. An adequate internal road system is being provided with small motor lay-bys and rest shelters. Further amenities will be provided by including ornamental streams, and a series of interesting vistas.

Reference grid: For ease of plotting and indexing, a system of numbered grid-points was laid out, each point being at the corner of squares of one acre. The markers consist of sunken concrete blocks set to the cardinal compass points and numbered consecutively.

Scope: While recognizing that trees are the major objective of the arboretum it is hoped nevertheless to include an almost complete range of shrubs capable of growing in this climate. Geographic forms and nurserymen's varieties are being included, where these are considered to be of importance to gardeners and landscape architects. It is estimated that the collection, when complete, may include over 6,000 species and forms.

Plant arrangement: Three plants of each species or form are being used, due regard being paid to color, likely size and shape, to achieve optimum placing. The arrangement of the plants is being determined by taxonomic classification, the full range being covered in two circuits of the arboretum. One circuit covers the Gymnospermae and the other the Angiospermae. These two are at times intermixed, by families, to improve the overall appearance of the arboretum. The classification being used is, broadly, that of Engler and Prantl. In a few special cases the rigid arrangement has not been adhered to, in order to give particularly delicate species or genera optimum conditions of site or shelter.

Ancillary collections: If space is available it is intended to plant specialised collections to include: 1. Street and roadside trees, 2. Varieties of trees such as 'weeping', fastigiate, golden, copper, silver etc., 3. Hedges, both grouped as a demonstration and also in position in various parts of the arboretum.

Plant supply: Material is expected from four major sources. 1. By approach to foreign governments who would be invited to offer gifts of trees or shrubs considered typical of their countries. 2. By direct purchase from nurserymen believed to have stocks of well authenticated material. 3. By exchange and gifts from other arboreta, botanic gardens and forestry authorities. 4. By propagation by seed, cuttings and grafting.

Phenological Garden: Already established is an International Phenological Garden administered from Offenbach in conjunction with the Irish Meterological Services. The plants in this collection (from 12 species) are all raised by grafting scions from selected trees, and these are established in a number of stations throughout Europe to study the effect of climate on plant growth.

FOREST GARDEN

Scope: About 141 acres were set aside to establish plots of all trees which were thought likely to form forest crops on this site. The number of species to be included is likely to be about 250. The roads and ride-lines which surround all plots reduce the plantable area to about 109 acres.

Layout: The area, which is on the higher ground of the Park, is divided in squares of one acre. Plot sizes, however, vary from one quarter to one acre according to the hardiness or availability of the species.

Arrangement: Due to many factors, including the fact that the arboretum is being laid out on taxonomic lines it was decided to use geographic classification in the Forest Garden, by allocating areas to each of the five continents. Within each continental area species arrangement is by hardiness of species, public interest, and scientific importance, as well as amenity considera-

(Continued on Page 70)

Chemical Weed Control in Nursery Plantings*

A. M. S. Pridham

A weed is a plant out of place! In crop production, carrots, corn, gladiolus, or lilacs, etc. are grown free of competition, i.e. free from weeds.

In gardens and parks the art of arranging and fitting land for human use and enjoyment is spelled out in planting plans and specifications. Plants not on the plans are out of place.

When no specific plans exist, you as the gardener make the decision, as to whether a plant is acceptable or out of place.

Important Weeds

A recent survey indicates weeds in nursery and ornamental plantings to be the perennial weeds, quackgrass, artemisia or mugwort, wild onion, nutgrass, bindweed, plaintain, dandelion, sorrel, thistle, Japanese bamboo and the "bird" plants, multiflora rose, mulberry, blackberry, honeysuckle and poison ivy.

Annual weeds included the summer group of crabgrasses and purslane and the fall or winter annuals, chickweed and annual bluegrass, also the biennials, mayweed, common chickweed, wild mustard and yellow rocket. Since garden plantings are in part permanent plantings and in part flower gardens of annual or semi-permanent type, weed control procedures include both preparation of the soil and year-round maintenance.

Start with weed-free soil

A large fraction of the "root system" of quackgrass and other perennial weeds is actually stem tissue with numerous buds ready to grow when conditions are favorable. Sampling of quackgrass and artemisia indicates that there may be a ton or more of such underground stems per acre.

Exposure of underground parts to hot summer sun or to the cold air temperatures of winter kills many perennial weeds. Replowing or working the soil again in early spring are also important. Herbicides such as Amizine and Simazine used on quackgrass before plowing in the fall improve the chances of eliminating this and some other perennial weeds.

Appropriate timing of the herbicide treatment on young regrowth foliage and use of adequate amounts of herbicide applied uniformly are as necessary as a thorough job of plowing and fitting the soil.

In some situations, soil can be treated with steam, or chemicals and fumigants to kill weeds.

Kill seedling weeds

Young seedling weeds, either before or as they first emerge, can easily be killed—sometimes by pulling, cutting, hoeing, or by weed cane for direct contact with individual dandelions or other plants. A weed bar can be used in a similar manner or can be dragged over a lawn or level surface. These devices are helpful in lawn and ground covers or rock garden plantings to deal with individual weeds that are difficult to pull out by hand.

Herbicides at planting time

Bare root seedlings of young annual plants set out in soil in which herbicide has been recently incorporated, may be injured severely. Similar seedlings transplanted from pots, etc. so that the young plant has its own root-soil ball free of herbicide, will grow satisfactorily in the "weed-free" soil. Chemical weed killers used on the surface of sandy soils following planting may be washed into the root zone of newly set ornamentals by heavy rain or irrigation. Irrigate after planting and before using herbicides.

Use of granular herbicides in October

In actual practice under nursery conditions for the past 15 years, granules of attaclay and other materials coated with herbicide have been spread over deciduous and

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*Reprinted with kind permission from Cornell Plantations, Cornell University, Ithaca, New York. (Winter Issue 1965-66)

evergreen plants with a rotary seeder or modified fertilizer spreader. The granules fall off the dry plant foliage to the soil where the weed killer is carried off the granule by moisture from rain or snow and over the soil surface to contact the stem or foliage of young weeds at germination or later stage of growth. Stem tissue of quackgrass, artemisia, and other weeds take up the herbicide, translocating it through the underground stem tissue. Originally (1950's) the carbamate (CIPC) was used as a spray or in granular form at a rate of 8 pounds active ingredient an acre to eliminate the fall annual weeds, as chickweed and annual bluegrass. These remained green in winter but died in March or later leaving woody plants to grow uninjured in weed-free soil in spring.

In the last 5 years Dichlobenil granular (Casoron) has removed not only fall seedling weeds but quackgrass and other perennial weeds such as artemisia, bindweed, horsetail (Equisetum) and nutgrass, all of which are important and often troublesome perennial weeds in nursery and ornamental plantings of trees and shrubs. Granular formulations of Diuron, Dinitro and Pentachlorophenol (Weed Beads), and Simazine are others useful in fall, primarily for killing annual and biennial weed seedlings. Recently granular Tordon has been effective in control of Japanese bamboo by treatments in August or later when garden plants are dormant and less likely to be injured.

Standard autumn treatment

Cultivate to kill late seedling weeds; then fertilize the weed-free soil in October. Hill up soil and, or, use Amizine at the rate of 2 pounds active ingredient an acre of Simazine or use granular Dichlobenil 5 pounds active ingredient an acre or Diuron granular 2 pounds active ingredient an acre. Follow a three-year rotation program of these herbicides.

The above generalizations apply primarily to wood ornamentals particularly in terms of yearly procedure and are based on early tests in the 1940's in Cornell Plantations and in research and present field trials in the plant nurseries of the Department of Floriculture and Ornamental Horticulture by Professors A. M. S. Pridham at Ithaca and Arthur Bing at the Ornamentals Research Laboratory on Long Island.

The Voice of the Rocks

Bernice Ferrier Smith*

In the midst of the flowering cherry trees and specimen conifers which surround the temple and palace parks of Kyoto, we visited one of the most unusual gardens of Japan—unusual because it has no flowers or grass, but is a garden of stones. This garden is at Ryoanji Temple, which dates from 1469. The garden area consists of white sand, raked in ribbed patterns, with a series of fifteen stones arranged in five "islands," in groups of five, two, three, two, three rocks. The design was planned by the artist Soami, and is supposed to mirror the contemplative philosophy of Zen Buddhism. "Ryoanji" means "Temple of the Dragon's Repose," and the garden is sometimes said to represent a tiger in flight with its cubs from one rock island to another, while pursued by a leopard. Another explanation is that it is an early example of abstract art—a bridge to contemplation. Our guide translated the inscription hung by the garden as: "Be still, and listen to the voice of the rocks," and suggested that the desired end of the contemplation is to feel "embraced by the benevolent hands of Buddha." It is a peaceful spot where the

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*Mrs. Smith gives us a further note on her visit to Japan following her interesting article carried in the Bulletin, Spring 1967.

The Arboretum Bulletin

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SPECIAL NOTICE

To keep membership in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and The Bulletin will be discontinued.

MEMBERSHIP BLANK

☐ Life	$500.00
☐ Sponsor	$100.00 to 500.00
☐ Supporting	50.00
☐ Contributing	25.00
☐ Sustaining	10.00
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The Arboretum Foundation,
University of Washington Arboretum
Seattle, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name .....

Address .....

All memberships are non-assessable.

MRS. J. THOMAS DOWLING

Mrs. J. Thomas Dowling, a member of the Board of the Arboretum Foundation, and one of two life members of the Editorial Board of the Arboretum Bulletin, died on June 15th at the age of 90. With her going the Arboretum and the Foundation have lost an enthusiastic and loyal supporter. As an active member of the Bulletin Board, she wrote the "Notebook" for many years —until her strength was no longer adequate to the task. In this capacity, she will be remembered gratefully by her many readers.

Gardening was Grace Dowling's vocation, her avocation, and her life. She brought to it an intensity of interest, a knowledge, and an aesthetic appreciation that made her Bainbridge Island garden, with its plantations of primroses, a joy and an eye-opener for all who saw it—and they were myriad.

Her keen interest in the culture of primulas eventuated in the serial publication of her exhaustive manuscript on the subject, in the Quarterly Bulletin of the American Primrose Society. This brought her a valued correspondence with Mr. Pierre DuPont and resulted in a contribution to his magnificent gardens, of primulas raised by Mrs. Philip Macbride for Mrs. Dowling.

Her generosity in sharing her knowledge, as well as her plants, will be recalled by all of her gardening friends. Her horticultural classes cleared the weeds from the paths of many incipient gardeners. The first class which was held at the Women's University Club in about 1926, was my introduction to gardening and to Mrs. Dowling. She later headed the classes in horticulture of the Seattle Garden Club. Under her tutelage, the members gained not only much knowledge, but infectious enthusiasm for gardening. In the Lake Washington Garden Club's Unit 2 of which she was a member for forty-odd years, her programs were all important contributions to a discriminating and serious group.

Grace Dowling was " a lady" in the deepest sense of the word. As she grew older and more feeble, she never lost her consideration for those around her, nor her

keen sense of humor. Her reward was the affection of all who served her. She lived her 90 years with graciousness and dignity and her influence will remain in the lives of all who had the privilege of association with her.

Sophie M. Krauss

REID KENADY TO ADMINISTER ARBORETUM EDUCATION PROGRAM

Reid M. Kenady, Jr., has been appointed by the College of Forest Resources as Assistant Director of the Institute of Forest Products. As such he will administer the Arboretum education program and other continuing education courses for forest and land managers. Mr. Kenady received a Bachelor of Science degree in Forestry from the University of Washington in 1959 and a Master of Science in Forestry in 1961. He spent four years in the U. S. Air Force 1951-55. While in college he held summer jobs with the U. S. Forest Service working in the Okanogan Primitive Area. From 1960 to 1967 he worked at the Weyerhaeuser Forestry Research Center in Centralia, Washington, where he conducted research in Douglas fir silviculture, soils, seed production and seed orchard management. He and his family are active in wilderness recreation, hiking and mountain climbing. He is an amateur sculptor, winning first award in the 1965 Southwest Washington Art Show (Sculpture Division).

ARE YOU A FRUSTRATED BONSAI ENTHUSIAST who desires competent instruction in the creation of this interesting art form? Limited openings are available in the Bonsai Classes taught by the Kelly Nishitani Unit of the Arboretum Foundation. For information regarding dates and details, please call Mrs. John Ademino, LA 5-3448.

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (March 1 through August 10, 1967): *Contributing*—Mrs. M. A. Pilling. *Annual*—Mrs. William K. Ball, Mrs. Ray L. Barham, Mrs. C. Davis Bates, David S. Battey, Mrs. L. R. Baugh, Mrs. M. E. Belding, Mrs. Ernest Bertschi, Mrs. Nicholas I. Biel, Mrs. Merrill M. Botham, Mrs. Edward E. Bowker, Mrs. Stanley L. Bryant, Mrs. James Burnell, Mrs. D. M. Checkley, Mrs. J. W. Clise, Mrs. Daniel H. Coleman, Mr. and Mrs. Wendell K. Crane, Mrs. Richard W. Dameyer, Mrs. John F. Doyle, Mrs. Robert F. Ellis, June FitzSimmons, Mrs. Adrian A. Foe, Mrs. Lawrence S. Francis, Mrs. J. E. Gould, Mrs. John E. Graham, Miss Carol Ann Gray, James A. Gunn, Mrs. James A. Gunn, Mrs. Roy Hacanson, Mrs. Jack A. Hare, Mrs. P. F. Hintze, Mrs. Gail W. Hogue, Samuel M. Howe, Mrs. Garrett S. Johnston, Mrs. Robert J. Kamerling, Mrs. Jack W. Keppler, Mrs. Thomas H. Kramer, Mrs. Merrill Kuehn, Robert G. Lane, Clarence Lewis, Mrs. C. S. Manning, Theodore R. Marston, Mrs. Anthony J. Martin, A. Dan McCoy, Mrs. Charles M. McGill, Mrs. John P. Miglorie, Gerald J. Moudry, Mrs. Kenneth W. Neel, Mrs. Carl R. Norden, Mr. & Mrs. John S. O'Connor, Mrs. Richard T. Olson, Mrs. Jonathan H. Ostrow, Mrs. Earl G. Parks, Mrs. Armond D. Pearson, Mrs. John C. Pellegrini, Mrs. S. J. Peterson, Mrs. David C. Pinkerton, Mrs. W. Lowell Reed, Mrs. Albert S. Rosellini, Mrs. Bernt Rygg, Mrs. Felix C. Rykken, Mrs. Joseph N. Scardapane, Mrs. John H. Schultz, Mrs. Joseph G. Sebren, Elizabeth Sestrap, Mrs. F. Sherbondy, Jr., Mrs. M. K. Shulenberger, Mrs. Harold J. Silverthorne, R. Nelson Smith, Mrs. F. M. Sweeney, Mrs. Hans J. Thomsen, Mrs. Homer E. Tibbitts, Mrs. M. M. Werekau, Mrs. William A. Wolfe, Mrs. Aaron E. Yormark, Mrs. V. C. Zooksworth.

We are also grateful to the following who have increased their membership dues to: *Supporting*—Mrs. Louise G. Harper. *Contributing*—Mrs. Maurice Jackson. *Sustaining*—Mrs. J. K. Holloway, Mrs. Harry Iverson, Mrs. Stanley Minor.

BOOK REVIEWS

GARDENING BY THE SEA by Daniel J. Foley
Chilton Books—$6.95

"If I had my choice it would be a garden by the sea! A place where untempered winds and ocean spray often challenge the most competent of gardeners. A place where sunlit dew makes even the tiniest plants appear like jewels in the morning sun. A place where the mingled fragrance of flowers mixed with the salt of sea breezes, give the air a bracing freshness. Nature with all of the force of her power holds sway, often using wind pruning and salt spray to sculpt trees and shrubs in the most elemental of art forms, stripping ruthlessly leaf and flower, twig and branch. There is something sublime in the masterful struggle between organic and inorganic forces and methinks old Mother Nature stands as umpire witnessing the noble game." So begins this delightful book by Daniel J. Foley, landscape architect, horticulturist and author. This combination of talents has produced a book of exceptional merit.

This poetic exhileration is accompanied by some very sound practical advice on the function of windbreaks, sand dunes, soil binders, screens and all sorts of clear and specific information relative to the crucial matter of moderating the effects of wind, salt spray, sand and tides.

Trees, shrubs, vines, ground covers, perennials, annual and bulbs are treated in separate sections, each section is accompanied by a reference list of plants selected for their adaptability to seacoast gardens. Each plant listed is described and suggestions given as to its possible use in the landscape scheme. There are careful cultural instructions about the proper time for planting and the conditions under which they should be used.

Of special value are the many plant combinations that are suggested. Some of these suggestions which would seem so suitable for a cape cod cottage on the east coast, such as the roses, peonies and gladiola may not seem appropriate for the west coast shoreline but there are many which would be good anywhere. Several of these combinations are shown in good black and white photographs with which the book is so generously illustrated. There are also some nice color plates in the center spread.

The style is chatty and entertaining. Often as not, a plant description may include short snatches of poetry and perhaps a bit of its history as well. Thus, 'Tradition has it that William the Conqueror brought the houseleek to England. It is a curious plant, with rosettes of fleshy leaves, it gathers its young around it in a cushion, hence the common name, hens and chickens.' And, 'If bayberry were an exotic shrub, somewhat costly or difficult to grow, chances are that it would be given a choice place in gardens.'

Standard garden maintenance is not neglected. Pruning, soil improvement, mulching, fertilizing, disease and pest control, winter protection are all dealt with briefly but clearly.

There is a special plant list at the back of the book which gives plants recommended for special situations which would be very useful for quick reference.

This book will be indispensable to the seaside gardener but it contains much that is interesting and useful to any gardener anywhere.

Esther Berry

Some of Our Favorites ☆

☆ *Won't You Send Us Yours?*

Stachyurus praecox

At an Arboretum Foundation Plant Sale in 1963, there were some small plants still on the tables about four in the afternoon, that had not been purchased. I was looking one over but didn't recognize the name or the few bare twigs that it bravely thrust upward and, really, there wasn't much about it to recommend it, except the advice of a knowledgeable, persuasive saleswoman. "Don't you know *Stachyrus Praecox?* Oh, you must have one!" It was a cutting grown by Unit Council volunteers in the Patricia Calvert Greenhouse and only thirty-five cents. Besides, it is not hard to talk me into buying any plant, so it came home with me. My enjoyment of this plant has increased as fast as it has in size. Now it is a five foot shrub (ultimate height about twelve feet) with graceful arching branches which are not bare in the winter, although the shrub is deciduous. The leaves fall off in the winter but the bare branches show the slowly forming racemes which develop into two or three inch, slender, drooping clusters of twenty-five to thirty flower buds. In very early February, these open into yellow, bell-shaped, one-half inch long blooms. The flowers are long lasting, giving interest to the plant long before the leaves begin to come out, and holding on until fall, slowly developing into fruit. By mid-summer, the flowers have evolved into handsome, textured greenish-yellow berries with red cheeks about one-third inch across. The leaves are alternate, deciduous, elliptic-ovate to ovate-lanceolate, rounded at the base with serrated edges, from three to six inches long. They are of a very soft green color with up-turned, rugged edges that are dusted with a rich coral-red margin. The same dramatic color is repeated in the midvein and in the bark of the new growth, and in the petioles. All this for thirty-five

cents! Come to the sale on the first Wednesday in October, the 4th, and see what interesting bargains you can find.

Mrs. John M. Peterson

Some of Our "Favorites" - Winter 1960 through Fall 1967

It is appropriate that Mrs. Peterson should bring us her "favorite" in this issue as she is General Chairman of our 1967 Plant Sale to be held October 4 at the Arboretum. This popular column was started in 1960 and we thought it would be interesting to list the plants discussed to date, authors and dates of Bulletins in which you will find them. You may also find them at the Plant Sale BUT if you want to be sure please place a special order with Mrs. Peterson—AD 2-8046 or Mrs. Neil Thorlakson—GL 4-0202.

Acer palmatum	Mrs. Donald C. Davis	Fall 1961
Arbutus Menziesii	Dean Gordon Marckworth	Winter 1966
Arbutus Unedo	Mrs. Frederick A. Bunge	Summer 1962
Chimonanthus praecox	Mrs. Rex Palmer	Winter 1960
Cornus canadensis	Mrs. John Schwager	Fall 1962
Crinodendron Hookerianum	Mrs. Robert Berry	Fall 1965
Cydonia oblonga	Mrs. Hugh Baird	Summer 1965
Enkianthus campanulatus	Mrs. J. T. DeFriel	Spring 1964
Fuschsias, The	Mrs. Bert Swift	Summer 1967
Garrya Fremontii	Mrs. Pat Ballard	Summer 1961
Hamamelis mollis	Mrs. B. O. Mulligan	Winter 1961
Helleborus corsicus	Mrs. Elliott DeForest	Summer 1962
Helleborus foetidus	Mrs. Albert Brauss	Spring 1966
Hepatica triloba	Mrs. J. W. Trosper	Winter 1960
Hostas, or Funkias, The	Mrs. J. Thomas Dowling	Fall 1963
Hydrangea serrata 'Grayswood'	Mrs. Kenelm Winslow	Fall 1961
Iris tenax	Mrs. J. A. Witt	Spring 1962
Jasminium nudiflorum	Mrs. David Metheny	Spring 1961
Laurus Nobilis	Mrs. Roger Spurr	Spring 1965
Liquidambar styraciflua	Mrs. Frank Calvert	Spring 1961
Magnolia stellata	Mrs. Jesse Wilkins	Winter 1964
Nandina domestica	Mrs. Robert Berry	Winter 1961
Oxydendrum arboreum	Mrs. J. Thomas Dowling	Spring 1962
Parrotiopsis Jacquemontiana	Mrs. Arthur Kruckeberg	Summer 1961
Photinia villosa	Mrs. Conner E. Gray	Fall 1964
Pieris floribunda	Mrs. Ray Brandes	Spring 1961
Pieris japonica	Mrs. Charles Dick	Spring 1963
Pittosporum Tobira	Mrs. Roland Pinkham	Summer 1963
Pterostyrax hispida	Mrs. Joseph P. Butler	Fall 1966
Prunus Mume 'Dawn'	Mrs. Lloyd Steen	Spring 1964
Prunus subhirtella 'Autumnalis'	Mrs. Leonard Wilcox	Summer 1963
Raphiolepis umbellata var. *ovata*	Mrs. J. A. Ogle	Summer 1964
Rhododendron 'Conemaugh'	Mrs. H. .P. Clausing	Summer 1966
Rhododendrons, Early Blooming	Mrs. Richard Kolesar	Spring 1967
Sciadopitys verticillata	Mrs. Kenelm Winslow	Fall 1963
Stachyurus praecox	Mrs. John M. Peterson	Fall 1967
Stranvaesia Davidiana	Mrs. Arthur Kruckeberg	Winter 1962
Styrax japonica	Mrs. M. Chris Johnson	Fall 1962
Zenobia pulverulenta	Mrs. Pat Ballard	Winter 1963

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Pedology

(Continued from Page 58)

contributes to salinization. The soils affected by this process are intrazonal and are called Halomorphic. They include the Solanchack, the Solonetz and the Solod soils.

Soils of Western Washington State

The soils of Western Washington State have formed under a cool to cold, subhumid to humid climate. Soils of this region occur under a forest vegetation composed mainly of Ponderosa pine, western white pine, white bark pine, Douglas fir, grand fir, larch and hemlock. Western red cedar, spruce and lodgepole pine are also common. The dominant zonal soils of this region are the: Brown Podzolic, Gray Brown Podzolic, Podzols, and Sols Bruns Acides. Prairie and Reddish Brown Lateritic are less extensive. The intrazonal soils are represented by Low humic glei and the Planosols. The Brown Podzolic, Gray-brown Podzolic and the Sol Bruns Acides are all affected in different degrees by the podzolization process. At higher elevations, under higher precipitation and lower temperatures true podzols are formed. In the lower slopes and in the lowland Podzolic soils are found. The Podzolic soils of the Pacific Northwest are characterized by the occurrence of angular spheroidal aggregates locally called "shot." This is a unique feature which is not duplicated in the Podzolic soils of the central and eastern states. The Prairie soils of the Pacific Northwest are dark-colored soils developed in treeless or park-land area. The origin of treeless areas in a predominant forest region is still unknown, although numerous theories have been advanced. Fires either natural or man-induced have been considered responsible for the establishment of herbaceous species. Whatever the cause for the Prairie may have been, a well developed Prairie soil shows a black upper horizon about 18 inches thick followed by a more grayish-brown horizon. The organic matter content of the black layer may ex-

ceed 20 per cent. In spite of the apparent close resemblance to the Prairie soils of southern Minnesota, South Dakota, Iowa, Illinois, Nebraska, Missouri, Kansas and Oklahoma the Prairie soils of western Washington are more acid and infertile for crop production. The Reddish-Brown Lateritic and the Yellowish-Brown Lateritic soils are occurring in areas of heavy rainfall and milder temperatures. These Lateritic soils of the Pacific Northwest have characteristics common to the Laterites of the humid, tropical and subtropical regions. They are well aggregated, very porous and have acquired a reddish color. On the other hand the soils of Washington do not show the deep weathering typical of the true laterites. In turn the soils of the Pacific Northwest are different from the soils of the Southeast United States in as much as they do not display a loose surficial soil and lack of a zone in (B horizon), the subsoil, of clay accumulation. The Reddish-Brown are distinguished from the Yellowish-Brown on the basis of color; the Yellowish-Brown are more yellow and less red. The Lateritic soils are found south of the last glaciation limit. The Humic Grei and Bog soils are the intrazonal soils formed under poorly drained sites.

Conclusions

The soils of western Washington have formed under cool to cold, subhumid to humid climate, they are of the Podzolic and Lateritic type. These soils are formed on a variety of geological formations and on different elevations. True Podzols are more predominant at high altitude, Podzolic in the lowland. Prairie soils are restricted to treeless areas. Lateritic soils are common in the wetter and warmer part of the Pacific Coast.

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(*Continued from Page 61*)

tions such as color and form of the particular trees. Plots of deciduous and evergreen trees have been interspersed and genera have not necessarily been kept together.

Progress: To date 57 species, mainly North American and European, have been planted covering an area of about 40 acres.

GENERAL SERVICES

Buildings: It is planned to build staff residences and an administration and reception centre is under construction. This building, which has a low-elevation design, will display effectively the use of timber and cut stone, with large areas of glass frontage and low-pitched copper roofing. Office accommodation for the administration of the Park will be provided and also a public concourse with suitable museum fittings, information panels and maps for the guidance of visitors. A lecture room with projection facilities, is also included in the design, and this will be partially panelled with a wide variety of timbers. A library consisting of current and historical journals and books of arboricultural, horticultural and forestry interest is being built up. The material in this library will be for the use of the staff or students working at the Park.

Meteorological Station: A very comprehensive range of recording instruments has been installed including a wide variety of thermometers, a rain-recorder, a rain-gauge, a sun-recorder and an evapotranspiration pan. It is hoped to install a series of anemometers at a later date.

Nursery: A small nursery has been established to hold stocks of plants for the Arboretum and Forest Garden and for general amenity and shelter work. It is hoped that a small glass-house and propagation facilities will also be provided.

Plant Quarantine: Suitable quarantine and plant inspection arrangements are being provided by the National Botanic Gardens, Dublin, thus enabling plants to be imported from all over the world.

Facilities for the public: It is expected that the Park will have a strong appeal to the public and to this end it is proposed to supply the requisite facilities for shelter, parking and picnicking. The entire Park and environs will be well signposted and all plants and forest plots will have adequate labels.

The Voice of the Rocks

(*Continued from Page 63*)

tourists appear to sense the deep restfulness of the garden. There is no murmur of conversation, and in the atmosphere of tranquility and calm which pervades the garden, the visitor may well believe that he can listen and hear the song of the rocks of Ryoanji.

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The Ancient Bristlecone Pine

(Continued from Page 48)

lived in the Cambrian period. A short trail leads to calcaerous formations where the fossils are embedded in the rock.

At Sierra View is a magnificent view of the Sierra Nevada and many ranges of the Great Basin. Signs identify peaks, glaciers and other points of interest. The great escarpment dominates the scene and most of the High Sierra from near Mt. Whitney to Tioga Pass is visible. A short trail leads to another viewpoint.

The pavement continues to Schulman Grove, center of most activities on the reserved area. A terrace with display case and picnic facilities are near the parking area. From this point self-guided trails lead to Pine Alpha, the first tree found to be more than 4,000 years old, and to the Methuselah Grove, site of the oldest known tree, 4,600 years old. An Inyo National Forest naturalist is on duty daily to answer questions and protect the area. More trails and exhibits are being developed and a visitor center and administrative offices are planned in the Schulman Grove area.

The White Mountain road continues 12 miles to the Patriarch Grove. It is passable for most passengers cars but thundershowers can erode the surface so visitors are advised to inquire about road conditions at Schulman Grove. A picnic area and self-guided trails have been built at the Patriarch Grove. The elevation here is 11,320 feet and the landscape of white dolomitic rock contrasts with the deep blue sky, the distant purple ranges of the Great Basin and the colorful trees. This is a photographers haven and the highlight of a trip to the Ancient Bristlecone Pine Forest.

The bristlecone pine, like the giant Sequoia and the tall Redwoods, is one of the most distinctive of all trees. Unlike them it faces the severest of growing conditions to reach an amazing balance with nature. The tree, its fight for survival and its setting of usual scenic beauty make a trip to the Ancient Bristlecone Pine Forest a memorable occasion.

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(Continued from Page 55)

has a very mild climate—about the equal of the southern Oregon coastal area, I should think. The gardens are divided into several sections, and those around the castle were largely in a moat-like section, depressed below the general ground level and had many plants from the warmer temperate areas. There were large *Cordyline australis,* very large plants of *Olearia* in varety, *Hoheria sexstylosa, Feijoa sellowiana* and similar material. The grounds inland had a marvelous avenue of silver fir that led to a large walled garden, part of which had a gigantic plant of *Rhododendron ponticum* we were told was between one fourth and one third acre across. A brisk walk took us to a woodland garden where we saw *Embrothrium* and *Crinodendron Hookerianum* flowering freely among the firs, Scots pines and beeches.

It was only a few miles back to Prestwick and our jet back to New York, not long enough for us to realize that this was it—the end until we were actually loading into the plane.

In retrospect I think we saw too much, too many gardens, gardeners, plants to be able to digest the experience. It was wonderful being with the group of people that constituted the tour and to have access to so many fine gardens as we did—I don't believe I should care to repeat the tour every year but I am very grateful that I was given the opportunity to join it. Finis!

ARBORETUM WEATHER RECORD 1966

		*Temperature		+Sunshine	
Month	*Rain (inches)	Highest	Lowest	Hours	% Possible
January	6.66	55°F.	27°F.	30.4	11%
February	2.89	64°F.	28°F.	99.7	35%
March	4.17	74°F.	28°F.	181.1	49%
April	2.88	77°F.	33°F.	206.1	50%
May	1.48	82°F.	38°F.	292.9	62%
June	1.10	87°F.	44°F.	285.2	60%
July	1.60	85°F.	48°F.	286.9	60%
August	0.34	92°F.	45°F.	318.0	72%
September	2.03	85°F.	45°F.	189.0	50%
October	3.17	77°F.	38°F.	120.9	36%
November	7.58	61°F.	30°F.	54.4	19%
December	8.74	55°F.	31°F.	17.7	7%
Total	42.05			2,082.3	
Normal	39.61				

*Measured at station west of greenhouse in Arboretum.

+Recorded at U.S. Weather Bureau Station, Seattle-Tacoma Airport.

Notes

Lowest recorded temperature for the year, Jan. 24th, 27°F.

Highest temperature for the year August 21st, 92°F. Also the only day with temp. above 90°F.

Greatest 24 hr. rainfall, Jan. 5th, 2.15 inches.

There were 19 days with a minimum temperature of 32°F. or below.

The last recorded spring frost was March 22nd (29°F.).

The first recorded fall frost was Nov. 11th (30°F.).

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